UNIVERSITY AT ALBANY
State University of New York

Algebra/Topology Seminar

Conan Gillis
Cornell University

Conjugator Length, Integer Compression, and the Baumslag–Gersten Group

Thursday, October 16, 2025
3:00 p.m. in Massry B010

ABSTRACT. Baumslag–Gersten's group $G = \left\langle s_0, t \mid ts_0t^{-1}s_0(ts_0t^{-1})^{-1} = s_0^2 \right\rangle$ is a well-known example in geometric group theory, particularly for its non-elementary-recursive (non-E.R.) Dehn function. Much work has been done to solve various decision problems in G, including a polynomial time algorithm for the word problem, due to Miasnikov, Ushakov, and Won, which uses a highly efficient implementation of compressed integer arithmetic based on binary sums. It is conjectured, however, that no E.R.-time algorithm exists for G's conjugacy problem. To shed light on this question, we study the conjugator length function $CL(n)$ of G, which provides another measure of complexity of the conjugacy problem based on G's intrinsic geometry. We show that, for any $\epsilon > 0$, $CL(n)$ lies (up to a standard equivalence) between two power towers $2^{2^{\cdot^{\cdot^{\cdot^2}}}}$ of heights $\lfloor (1 - \epsilon) \log n \rfloor$ and $\lfloor \log n \rfloor$ respectively. The talk will focus on the lower bound, where our main technique involves "reversing" the integer compression to obtain a lower bound on the word-length of certain elements of G.